in addition to a lesion of the zone of Wernicke also a lesion of the lenticular zone or of the inferior longitudinal fasciculus. Dr. Dercum said he agreed with Dr. Prince that every case should be studied microscopically, but first we have to do our gross work. At the same time if the third frontal convolution has to do with speech, he thinks it is incumbent upon those who maintain that old view to prove it.

THE LOCALIZATION OF THE MOTOR AREA BASED UPON EXACT FARADIZATION.

By Dr. Alfred Gordon.

A case of focal epilepsy, in which the convulsions were confined to the left arm. A large osteoplastic flap was removed and the Rolandic area was exposed. Careful fradization with the unipolar method showed that irritation of the ascending frontal convolution and of the fissure itself gave distinct contractions on the opposite side. Irritation of the ascending parietal convolution gave also contractions on the opposite side, but far less marked.

A Stury in Tactual Localization in a Case Presenting Astereognosis and Asymbolia Due to Injury to the Cortex of the Brain. By Dr. Morton Prince. (*See this journal*, p. 1.)

Dr. M. Allen Starr said he felt that this paper of Dr. Prince's is a very interesting one. It is very evident that careful psychological analysis must go along with our analysis of the symptomatology in all these cases. He said he had been accustomed to teach that the symptom of astereognosis was due not so much to the loss of function of any special area of the cortex as to the interference with the association processes that are necessary to the building up of the concept, using the word concept in Charcot's sense, which is familiar in his illustration of the concept "bell." The point in the brain where the majority of these association fibers cross one another lies just beneath the cortex of the inferior parietal lobule just posterior to the posterior central convolution, and all the cases that Dr. Starr could get together that presented symptoms of astereognosis showed a lesion of that area of the brain, not merely cortical, but many of them (and he thought practically all of them), involving the subcortical association fibers that pass beneath the cortex at that point. It seemed to him, therefore, in speaking of astereognosis, as Dr. Prince has very well brought out, we are dealing with a complex association process rather than with the loss of a single sense, and that the reason why we have to locate the astereognosis lesion at that region is because that is the region where these association fibers particularly intersect.

Dr. P. C. Knapp said he had always felt much skepticism about this question of astereognosis, primarily from the fact that he had never yet encountered the report of a pure case of astereognosis; namely, a case of the inability to recognize an object when every form of tactile and muscular sensibility was normal. Even to-day our ideas of the visual and auditory agnoses have received what might be termed a jolt, as was shown in the discussions of aphasia at this meeting; but the idea that was formulated in regard to both soul blindness and soul deafness, or better visual agnosis and auditory agnosis, was that those conditions were the inability to recognize by sight or by hearing, although the visual sense and the auditory sense were found to be perfectly normal. He said he had been able to find no case recorded in which there was a tactile agnosis, and yet the various forms of tactile and muscular sense were perfectly normal. In the second place, approaching the matter from the psychological side, we could hardly admit any very large center for the recognition of objects by the touch in the brain, because the ideas which we derive from the sense of touch are so extremely slight, and are limited, perhaps, to the ability to recognize the difference between a jack-knife and a latch-key in our pockets, or something like that, excepting, of course, in such cases as that of Laura Bridgeman or Helen Kellar. Theoretically, of course, we may assume that there is a group of neurones, as Dr. Starr has suggested, more of an association process, which are devoted to the recognition of tactile impressions. Dr. Knapp said he doubted if these are sufficiently extensive so that one can speak really of a stereognostic center. The distinction which Dr. Prince draws between pure astereognosis and asymbolia is rather subtle, yet perhaps hardly warranted, inasmuch as in the more highly developed senses, such as hearing and sight, we do not make quite that sharp distinction. Of course the perception of space relations in sight is as great or greater than it is with the touch, and that is a complex process, but it is simply the degree of complexity. In the particular case which Dr. Prince speaks of, Dr. Knapp said he had several times found a very slight loss of sensibility to touch, but he was not disposed to attribute that to fatigue. Dr. Starr has spoken of the difficulty being due to a deeper lesion involving the association fibers beneath the cortex. That may perhaps be an explanation, although with the loss of the different forms of sensibility there is, as Dr. Prince has very clearly shown, the failure of sufficient impressions reaching the brain for us to form any real judgment.

Dr. C. K. Mills said that he thought the main questions for discussion in Dr. Prince's paper (or among the main questions) are those concerned with the existence of separate regions for stereognostic perception, or conception, as Dr. Mills prefers to call it, and also the possibility of subdividing these centers of stereognostic representation. He said he thought that sometimes the views of those who believe in a very large and rather extreme division of functional regions in the brain, and indeed in the nervous system, are to some extent misunderstood. His own belief, as is well known, is that this subdivision is very great, that in the process of evolution centers have been added to centers in large number.

He has based his idea of the existence of a stereognostic area on the general biological assumption of the gradual development of association areas between the primordial projection areas. One of these areas, the posterior association area of Flechsig, he has designated as a concrete concept or concrete memory field. In this great field have developed in the course of racial and individual evolution, many cortico-subcortical centers of many sorts dependent upon the evolution of association processes. A certain portion of this region, the superior parietal lobule, is intercalated between those cortical areas which are concerned with the recognition of objects. It is next door on the one hand to the visual area. It is next door in another direction to what is probably the area of orientation; and it is next door in still another direction to the centers for cutaneous and muscular sensibility. And in this region, which is located between all these sensory areas, would naturally develop in cortex and sub-cortex, the highly evolved stereognostic area.

Dr. W. G. Spiller said that so far as he is familiar with the literature no reported case justifies the assumption that any cortical region except the parietal lobe is concerned with stereognosis. When we try to define the word center it is with more or less uncertainty. No one can separate clearly, in the use of such a term, the cortex from the subjacent white matter. Any center that we choose to refer to, the center of word hearing, for instance, certainly is dependent upon the integrity of the white matter immediately beneath the cortex of that part, as well as upon the integrity of the cortex itself, and therefore on the integrity of connecting fibers. When Dr. Spiller has used the word center in speaking of stereognosis he has used it in this sense. In all of the cases he knows of there has been some involvement in the sense of position or of some other form of sensation. He is inclined to think that the greater part of the parietal lobe is concerned in the function of stereognosis and not merely the lower part.

Dr. Morton Prince said he had ended his paper by saying that tactile stereognosis and asymbolia are abstract symbols. They are symbols of complex tactual defects, and if the terms are adopted they should be used only as symbols to describe such defects. He does not regard them as functions at all. They are judgments which are dependent upon the information given us by our senses, nothing more than that. Therefore to attempt to localize a symbol, an abstract symbol, is simply localizing a general intellectual process, and so far as our present knowledge goes we cannot localize an intellectual process.

As to what Dr. Knapp said as to the distinction between stereognosis and asymbolia, Dr. Prince said he would agree with him very largely, nevertheless we do find cases where the loss of tactual defect is sufficiently slight to allow one to recognize the object itself. Therefore these terms are convenient expressions to describe the amount of tactual loss.

With regard to what Dr. Mills said, Dr. Prince recognized, of course, the biological argument, but it does not seem to him to touch the problem. It is a matter of induction from facts. Now the facts are these. If we have extensive loss of certain tactual perceptions we cannot possibly recognize the test object.

In every case of asymbolia which has been reported and which has been sufficiently tested there has been loss of one or more of the tactual perceptions, such as localization, pressure, etc., needed for the recognition of objects.

As this loss will abundantly account for the asymbolia (stereognosis) it is bad reasoning and unjustifiable to assume a special function of recognition of objects and localize it on this evidence. No physiologist would dream of localizing such a function without demonstrating its loss with preservation of all forms of tactual sensations and perceptions concerned in it. The evidence justifies the localization of these tactual functions, nothing more.

A NEW TYPE OF ATAXIA.

By Dr. M. Allen Starr.

Patient in otherwise perfect health has slowly developed during eight years a progressive bilateral nerve deafness, and with it the symptoms of cerebellar ataxia. Is now totally deaf and walks with much difficulty.